



**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Application No.: 09/895,703  
Filing Date: June 29, 2001  
Applicant: Jeff Zentner et al.  
Group Art Unit: 2136  
Examiner: David G. Cervetti  
Title: KEY PAD DECODER  
Attorney Docket: HP PDNO 10014498-1

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**APPELLANT'S SUPPLEMENTAL BRIEF**

This is Appellant's Supplemental Brief filed in accordance with 37 CFR §1.192 appealing the Examiner's Final Rejection mailed May 9, 2005, and in response to the Notice of Non-Compliance Appeal Brief mailed December 28, 2005. Appellant's Notice of Appeal, pursuant to 37 CFR §1.191, and a one month extension of time were filed September 9, 2005. This Brief is being submitted in triplicate. The Appeal Brief fee was paid when Appellant's Brief was filed on October 3, 2005.

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35 USC §102(b).....	1, 2, 3, 10
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**I. Real Party in Interest**

The real party in interest for this appeal is Hewlett-Packard Company of Fort Collins, Colorado, the Assignee of the application.

**II. Related Appeals and Interferences**

There are no related appeals or interferences.

**III. Status of the Claims**

Claims 1-6, 9-12 and 14-18 are pending in this application, claims 7, 8 and 13 having been cancelled by the Amendment filed February 24, 2005. Of these claims, claims 1, 3-6, 9-12 and 14-18 stand rejected under 35 USC §102(b) as being anticipated by Kwon et al. (hereinafter Kwon), and claim 2 stands rejected under 35 USC §103(a) as being unpatentable over Kwon in view of the De Jesus et al. (hereinafter De Jesus).

**IV. Status of Amendments**

All amendments have been entered.

**V. Summary of the Invention**

Appellant's invention is a system and related method for determining which key 16 of a key-pad device 10 is activated to determine a sequence of entered keys, such as for securely entering a personal identification number. The system uses an algorithm 30 that employs the same number of steps to make the determination regardless of which key 16 is pressed (claims 1 and 10, page 4, lines 6 – 8 and page 7, lines 8 - 10). The algorithm 30 assigns a key press value to each key 16 on the key-pad 14 (claims 7, 10 and 15, page 6, line 1). The system adds the key press values when the keys 16

are pressed (claims 1, 10 and 15, page 6, lines 15 and 16). The algorithm 30 first determines if more than one key 16 is pressed in more than one column (claims 1, 10 and 15, page 9, lines 18 and 19). If the algorithm 30 determines that only one key 16 has been pressed in one column, the algorithm 30 then determines which key 16 has been pressed by adding the key value for each key 16 pressed on a row-by-row basis (claim 6, page 6, lines 16 – 22). Once the algorithm 30 calculates the key press value, it then determines whether the added key value exceeds a predetermined value to determine if more than one key 16 has been pressed in the rows (claims 1, 10 and 15, page 7, lines 1 – 6 and page 8, lines 4 – 14). If the added value does exceed the predetermined value, then the algorithm 30 knows that more than one key 16 has been pressed and initiates a multiple key press sub-routine (page 5, lines 30-32 and page 6, lines 2-11). If the added value does not exceed the predetermined value, then the added value is subtracted from another predetermined value to give the key value to identify the key 16 that is transmitted from the device 10 (page 7, lines 6 – 8 and page 7, line 14 – page 8, line 3).

## **VI. Grounds of Rejection to be Reviewed on Appeal**

Whether claims 1, 3-6, 9-12 and 14-18 should be rejected under 35 USC §102(b) as being anticipated by Kwon, and whether claim 2 should be rejected under 35 USC §103(a) as being unpatentable over Kwon in view of De Jesus.

## **VII. Argument**

### **A. Independent claims 1, 10 and 15 are not anticipated by Kwon et al.**

#### **1. Independent claims 1, 10 and 15**

Independent claims 1 and 10 claim a key pad device including a plurality of keys and a key pad controller. The key pad controller assigns each key a predetermined key press value and adds the key press values when the keys are pressed. The controller compares the added key value to a predetermined value to determine if multiple keys have been simultaneously pressed.

Independent claim 15 claims a method for determining which key of a key-pad device has been pressed that includes assigning each key a key press value; determining if a key has been pressed in one of the columns; advancing a counter by a counter value if a key has been pressed; determining if a key has been pressed in a next column and adding the counter value to the counter if a key has been pressed, otherwise keeping the counter value the same; adding the key press value of all of the keys that have been pressed in a first row to generate a first row added key value; adding the key press value of all of the keys that have been pressed in a second row and adding the added key press values of the second row to the added key value; determining whether the added key value exceeds the predetermined value; transferring the key value from the key-pad device if the added key value does not exceed the predetermined value; and comparing the added key value to a predetermined key value to determine if multiple keys have been simultaneously pressed.

#### **2. Anticipation**

Appellant respectfully submits that the Examiner has improperly held that Kwon et al. anticipates all of claims 1, 3-6, 9-12 and 14-18 under 35 USC §102(b). MPEP 2131 states that “a claim is anticipated only if each and every element as set forth in the

claim is found, either expressly or inherently described, in a single prior art reference.” Appellant submits that the Examiner has not shown every claim element of any of these claims is found in Kwon.

### **3. Kwon et al.**

Kwon discloses a key scan circuit for a key pad 20 that determines which key in the key pad 20 has been pressed by a process shown in figure 3. The Kwon key scan circuit includes a first memory MA that is initialized with the bits 1111 and a second memory MB that is initialized with the bits 0000, where the memory MA is used to determine if a key is pressed in one of the rows of the key pad 20 and the memory MB is used to determine if a key is pressed in one of the columns of the key pad 20, as shown in figure 2 of Kwon. If no keys are pressed, then the memory MA and MB remain 1111 and 0000, respectively. If a key is pressed on the key pad 20, then the corresponding bit in the memory MA will be changed to a 0 depending on what row the key is in, and the corresponding bit in the memory MB will be changed to a 1 depending on what column the key is in. In other words, one of the bits in the memory MA is changed if any key is pressed in the row that that bit represents, and one of the bits in the memory MB is changed if any key is pressed in the column that that bit represents.

The Kwon key scan circuit determines if multiple keys are simultaneously pressed (double-key) in step S609 of figure 3. Particularly, if multiple keys are pressed, the key scan circuit will put more than one 0 bit in the memory MA and/or more than one 1 bit in the memory MB. Column 4, line 16 – 21 of Kwon states, “if more than one logical “0’s” appear in first memory MA, or if more than one logical “1’s” are present in second memory MB, step S609 judges that multiple keys are being pushed, then the operation advances to step S610 and performs an error process, and then completes

the operation.” If a double-key is not pressed, the Kwon scan circuit calculates a key value to identify the key at step S611 using the formula  $4m+n=MB$  (column 4, lines 22-29).

#### **4. Discussion**

Appellant respectfully submits that Kwon does not teach assigning a predetermined key press value to each key. The keys are identified by the overlap of the logical 0s and 1s in the memories MA and MB, and therefore each key is not assigned its own predetermined key press value. A key is defined using the formula  $4m+n=MB$ . Therefore, Kwon also does not teach adding the predetermined key press value when the keys are pressed to identify the key. Thus, Appellant submits that Kwon does not anticipate independent claims 1, 10 and 15 for these reasons.

In Appellant’s claimed invention, once the key press values are added, the added key value is compared to a predetermined value to determine if multiple keys have been simultaneously pressed. The Examiner states that Kwon teaches that the key scan circuit compares an added key press value to a predetermined value to determine if multiple keys have been simultaneously pressed, citing column 4, lines 9-66. However, the Examiner does not provide any discussion as to how the Kwon scan circuits does this. Appellant respectfully submits that Kwon does not provide this teaching.

Appellant respectfully submits that the only teaching in Kwon of determining whether multiple keys have been pressed is found in column 4, lines 14-21 and column 4, lines 62-65 discussing step S609. This section of Kwon states that the key scan circuit determines that multiple keys have been pressed if more than one bit in the memory MA is 0 or more than bit in the memory MB is 1. Nowhere in those sections, or any other section of Kwon, does it teach that the key scan circuit determines if multiple



keys have been simultaneously pressed by comparing an added key press value to a predetermined value. Therefore, Appellant respectfully submits that Kwon does not anticipate Applicant's independent claims 1, 10 and 15 for this reason also.

Independent method claim 15 claims a specific sequence of steps for determining which key of a key-pad device has been pressed that includes determining if a key has been pressed in one of the columns, advancing a counter, determining if a key has been pressed in the next column and adding a counter value to the counter, adding the key press value of all the keys that have been pressed in the first row, adding the key press value of all the keys that have been pressed in the second row and determining whether multiples keys have been simultaneously pressed in the manner discussed above.

Appellant submits that nowhere in Kwon does it teach these specific steps for determining which key of a key pad device has been pressed, and the Examiner has not identified anywhere in Kwon where these steps are taught. For example, Appellant can find no teaching in column 3, lines 60-68 of Kwon of the claimed advancing a counter by counter value if a key has been pressed, determining if a key has been pressed in the next column and adding the counter value to the counter if a key has been pressed, otherwise keeping the counter value the same, as suggested by the Examiner. Further, Applicant can find no teaching in column 3, lines 60-68 of the claimed adding the key press value of all of the keys that have been pressed in a first row to generate a first row added key value, adding the key press value of all of the keys that have been pressed in a second row and adding the added key press values of the second row to the added key value, as suggested by the Examiner.

**B. Dependent claims 2- 6, 9, 11, 12, 14 and 16 – 18 are also not anticipated by Kwon et al.**

The Examiner states that the limitation in dependent claims 5 and 11 of adding a counter value to a counter if a key is activated in a column can be found in column 3, lines 60-68 of Kwon. That section of Kwon is recreated below.

Meanwhile, if step S604 shows PA to be other than "1111", the decision process determines that at least one key has been pressed in step S602, and advances to step S605 where the microprocessor 10 carries out two logic functions: first, the current value of first memory MA is multiplied by the logic value of first port PA, then restored into MA, and secondly, the current value of second memory MB is summed with the logic value of data direction register DDR, then restored into MB.

Appellant can find no discussion in this section of Kwon of adding a counter value to a counter if a key is activated in a column, and therefore, Kwon cannot anticipate dependent claims 5 and 11.

The Examiner also states that the limitation in dependent claims 5 and 11 of determining which column is being monitored for a key activation by a set bit in a digital word can be found in column 3, lines 49 – 55 and column 4, lines 22 – 42. Those sections of Kwon are recreated below.

If any keys in that column have been pressed, they are found in step S604, where the first port PA is checked against the value "111" which corresponds to the pull-up resistors 30. If PA matches "1111", it is determined that none of the input port bits are pulled low, and no pressed key exists in that column.

In the meantime, if there is only one "0" in MA and one "1" in MB in step S609, step S611 defines the key's value with the formula:  $4m+n=MV$  which allows S612 to key in and terminate the procedure. Here, MV denotes the key's value, m corresponds to a value of m when the mth bit of first memory MA is a logic "0", and n corresponds to a value of n when the nth bit second memory MB is a logic "1".

For example, if the 9th key of the keypad's matrix is pushed in step S602, "1011" is fed to the first port PA. In doing so, the value "1111", initialized MA set in step S601, is logically

multiplied by the value "1011", i.e., the currently held input value of PA, and the product "1011" is stored in the first memory MA. Second memory MB calculation is executed by logically summing the value "0000", initialized MB set in step S601, with the value "0010", i.e., the current state of DDR, and the result "0010" is stored in the second memory MB. Thus, as m becomes two via bit b2 and n becomes one via bit b1, MV is figured to be nine, or the 9th key in the matrix.

Appellant has carefully reviewed these sections of Kwon and can find no teaching therein of determining which column is being monitored for a key activation by a set bit in the digital word. Therefore, Appellant submits that Kwon cannot anticipate this limitation of Appellant's invention either.

The Examiner states that the limitation of dependent claims 9, 14 and 17 concerning subtracting the added key value from a predetermined value to calculate a key value to be transmitted can be found in column 1, lines 59 – 62, column 3, lines 2 – 22 and column 4, lines 1-29. Those sections of Kwon are recreated below.

"a second memory for storing the logic value of n column signals input to the second port logically summed with the logic values of the data direction register; and"

"A microcomputer 10 comprises a first port PA having 4 bits b0, b1, b2 and b3 for receiving a 4-bit row signal via row scan lines 50 when any key is pressed on keypad 20; a first memory MA for storing the logic value of the 4-bit row signal input to the first port PA logically multiplied by the previously stored logic value therein; a second port PB having 4 bits b0, b1, b2 and b3 for outputting, the 4-bit column signal from the keypad 20 via column scan lines 40; a data direction register DDR for setting each bit of the second port PB to the input or output mode; a second memory MB for storing the logic value of the 4-bit column signal input to the second port PB logically summed with the logic value of each bit of a data direction register DDR. Pull-up resistor portion 30 for supplying a reference logic value to keypad 20 is coupled to the keypad 20 and an AND gate 60. The AND gate 60 provides a logical product of the signals output from keypad 20, to be used as a control signal for performing an automatic on/off function of the microcomputer system or for supplying a key check signal."

"After step S605, the carry bit is cleared and a rotate shift left function is done by the data direction register DDR in step S606.

Step S607 checks if carry bit value C equals one. This occurs when the data direction register DDR, set to "0001" in step S603, has completed four rotate shift left functions and all columns have been scanned. Steps S604, S605, and S606 are repeated until C=1.

After key-scanning, steps S608 and S609 decide how many, if any, keys are pressed. If C=1 in step S607, it is determined whether the second memory MB is still set to "0000" in step S608. If MB=0000 in step S608, the operation is complete with no pressed keys being detected. However, if MB.noteq.0000 in step S608, the operation moves to step S609 to determine if there has been a double-key error. If more than one logic "0's" appear in first memory MA, or if more than one logic "1's" are present in second memory MB, step S609 judges that multiple keys are being pushed, and then the operation advances to step S610 and performs an error process, and then completes the operation. "

In the meantime, if there is only one "0" in MA and one "1" in MB in step S609, step S611 defines the key's value with the formula:  $4m+n=MV$  which allows S612 to key in and terminate the procedure. Here, MV denotes the key's value, m corresponds to a value of m when the mth bit of first memory MA is a logic "0", and n corresponds to a value of n when the nth bit second memory MB is a logic "1".

Appellant has reviewed these sections of Kwon and can find no teaching therein of subtracting the added key value from a predetermined value to calculate key value to be transmitted. Therefore, Appellant submits that Kwon cannot anticipate dependent claims 5 and 11 for this reason also.

**C. Dependent claim 2 is not obvious in view of the combination of Kwon et al. and De Jesus et al.**

Dependent claim 2 states that the key-pad device includes a display and a magnetic strip reader. Appellant acknowledges that these components of a key-pad device are known in the art. De Jesus discloses a transactional terminal that includes a

display and a magnetic strip reader. However, Appellant submits that the Examiner has not stated that De Jesus includes the limitations of Appellant's claimed invention discussed above that could make Appellant's claimed invention obvious.

#### **VIII. Conclusion**

Appellant respectfully submits that claims 1, 3-6, 9-12 and 14-18 are not anticipated by Kwon and that dependent claim 2 is not made obvious by the combination of Kwon and De Jesus. It is therefore respectfully requested that the Examiner's Final Rejection under 35 USC §102(b) and §103(a) be reversed, and that Appellant's claims be allowed.

Respectfully submitted,

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CLAIMS APPENDIX

**COPY OF CLAIMS INVOLVED IN THE APPEAL**

1. A key-pad device comprising:  
a key-pad including a plurality of keys; and  
a key-pad controller providing a key value signal when one of the keys is activated, said controller determining which key is activated by a process including a predetermined number of steps, wherein the process has the same number of steps regardless of which key is activated, and wherein each key is assigned a predetermined key press value, said controller adding the key press values when the keys are pressed, and wherein the controller compares the added key value to a predetermined value to determine if multiple keys have been simultaneously pressed.
2. The device according to claim 1 further comprising a display and a magnetic strip reader.
3. The device according to claim 1 wherein the plurality of keys are arranged in a plurality of rows and a plurality of columns.
4. The device according to claim 3 wherein the controller determines if more than one key has been activated in more than one column.
5. The device according to claim 4 wherein the controller adds a counter value to a counter if a key is activated in a column, and wherein the controller determines which column is being monitored for a key activation by a set bit in a digital word.
6. The device according to claim 3 wherein the controller determines which key has been activated on a row-by-row basis.
7. Cancelled.
8. Cancelled.

9. The device according to claim 1 wherein the controller subtracts the added key value from a predetermined value to calculate a key value to be transmitted.

10. A key-pad device for transferring a key value representative of a key press to a terminal, said device comprising:

a key-pad including a plurality of keys arranged in a plurality of rows and a plurality of columns, each key being assigned a key press value; and

a key-pad controller outputting the key value to the terminal when one of the keys is pressed, said controller determining the key that is pressed by a process including a predetermined number of steps, where the number of steps is the same regardless of which key is pressed, said controller determining if more than one key has been pressed in more than one column, and then if only one key has been pressed, determining which key has been pressed on a row-by-row basis by adding the key press values for each key that is pressed, wherein the controller compares the added key press value to a predetermined value to determine if multiple keys in a column have been simultaneously pressed.

11. The device according to claim 10 wherein the controller adds a counter value to a counter if a key is pressed in a column, and wherein the controller determines that more than one key has been pressed in more than one column if the counter value in the counter is greater than a predetermined value.

12. The device according to claim 10 wherein the controller adds the key press value for each key pressed in a particular row before moving on to a next row.

13. Cancelled.

14. The device according to claim 10 wherein the controller subtracts the added key value from a predetermined value to determine the key value to be transmitted to the terminal.

15. A method for determining which key of a key-pad device having a plurality of keys arranged in a plurality of rows and a plurality of columns has been pressed, comprising:

assigning each key a key press value;  
determining if a key has been pressed in one of the columns;  
advancing a counter by a counter value if a key has been pressed;  
determining if a key has been pressed in a next column and adding the counter value to the counter if a key has been pressed, otherwise keeping the counter value the same;  
adding the key press value of all of the keys that have been pressed in a first row to generate a first row added key value;  
adding the key press value of all of the keys that have been pressed in a second row and adding the added key press values of the second row to the added key value;  
determining whether the added key value exceeds a predetermined value;  
transferring the key value from the key-pad device if the added key value does not exceed the predetermined value; and  
comparing the added key value to a predetermined key value to determine if multiple keys have been simultaneously pressed.

16. The method according to claim 15 wherein the key-pad includes four rows and four columns, and wherein advancing the counter for each pressed key in each column is performed for all four columns, and wherein adding the key press values for all of the keys is performed for all four of the rows.

17. The method according to claim 15 further comprising subtracting the added key value from a predetermined value to calculate the key value that is transmitted.

18. The method according to claim 15 wherein determining if a key has been pressed in one of the columns includes setting a set bit for a particular column if a key has been pressed in that column.



EVIDENCE APPENDIX

There is no evidence pursuant to §1.130, §1.131 or §1.132.

RELATED PROCEEDINGS APPENDIX

There are no decisions rendered by a court or the Board in any proceeding identified in Section II of this Appeal Brief.



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PATENT APPLICATION

ATTORNEY DOCKET NO. 100144981-1

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IN THE  
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Jeff Zentner et al.

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Title: Key Pad Decoder

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Commissioner For Patents  
PO Box 1450  
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TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on 9-9-2005.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) \$500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

☐ 1st Month  
\$120

☐ 2nd Month  
\$450

☐ 3rd Month  
\$1020

☐ 4th Month  
\$1590

☐ The extension fee has already been filed in this application.

☐ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of \_\_\_\_\_. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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